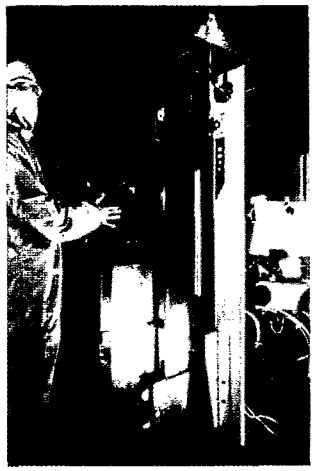
Foundry prospects

Worldwide wafer fab equipment revenue in 2002 totalled $16.5bn, a 31.6% decline from 2001's $24.1bn revenue, reports Gartner Inc. "All major segments were affected by the industry decline in 2002. In 2002, some emerging technologies, such as SiGe epitaxy and atomic layer deposition, demonstrated growth and a few of the technology segments associated with copper dual damascene grew, but as a whole, all segments failed to inspire the industry."



Fab worker at 1st Silicon facility in Malaysia. Photo courtesy of Eddie Shvartzman

All regions experienced declines. Europe dropped 46% from 2001. Japan fell 45%, the Americas 29% and Taiwan 10% dip, saved by a Q2 buying spree, and limited capacity at 130nm. Rest of Asia-Pacific, benefiting from the activity in China, declined by 12.8%.

"Overall foundry capacity utilisation remains low," says Peter Chang, UMC vice chair. "Capacity glut will continue in 2003 though leading-edge capacity will be in short supply, due to significant capital spending cuts during 01-03. Declining to forecast for 2003; "the overall visibility is low," Chang put figures for pure-play foundry growth expected at $7.5bn in sales in 2002, rising to $32bn by 2010 with demand from both fabless chip makers and IDMs. Foundries had 50% of wafer sales from fabless design houses in 2002, 47% is expected in 2003. By 2007 44% of foundry wafer sales will come from fabless chip makers. Foundries got 41% of wafer sales from IDMs in 2002 and expect 45% in 2003. By 2010, this is projected at 48%, the balance coming from system houses.

Massive build up of foundry capacity is anticipated from a half-dozen start ups in China, Korea and Malaysia. The "Big 3" foundry providers—Chartered, TSMC, and UMC—alone are expected to produce 369,000 8-inch wpw. New foundries projected to produce 150,000 wpw at 0.35- to 0.18-micron technologies. Foundry capacity is up 40% since 2000.

War between Palladium membrane and catalytic purifiers

In its April *Technical Bulletin 0403*, Johnson Matthey takes a resounding swing at claims of ambient catalytic purifiers compared to itsPalladium (Pd) membrane. The claims it says are not accurate and responds to each.

Claim: Catalytic purifiers operate at low H2. Pd membrane cannot support these lower pressures.

Response: Pd membranes operate on liquid or compressed hydrogen supply systems. Compressed systems with inlet pressures of 250psi allow the use of smaller purifiers for required flow rates. For liquid hydrogen systems with supply pressures of 140 psi, slightly larger Pd membrane purifiers are necessary to supply the required flow rates. Most manufacturing facilities in the US and Europe use Pd membrane purifiers for their liquid hydrogen purification.

Claim: Catalytic purifiers have better uptime because they do not have membranes that can crack.

Response: Pd membrane purifiers can crack when the cell is repeatedly allowed to cool (ie from power failure) in presence of hydrogen. The V purge system from Johnson Matthey protects the membrane by removing all H2 automatically within minutes while replacing the hydrogen with non reactive nitrogen. This feature combined with improved thermal management significantly eliminates the risk of 'cracks caused by improper operation.'

Claim: Catalytic purifiers dry down more quickly than Pd membrane purifiers during initial installation and startup.

Response: Pd membrane purifiers do not allow moisture to pass through so there is no required 'dry down' for the membrane start up. Any dry down time is related to purging of the piping system. This is required for any purifier technology.

Claim: Catalytic purifiers do not release hydrocarbons; the implication is that Pd do so.

Response: Pd membranes remove all hydrocarbons, including methane and other carbon species such as CO and CO_2. Catalytic purifiers do not remove methane, have limited capability to remove some carbon species including CO_2. Therefore purity is compromised with the use of catalytic purifiers.

Flexible OLEDs and PolyLEDs displays

The US Display Consortium exploring organic light-emitting diodes (OLEDs) and polymer LEDs (PolyLEDs) awarded the first of a series of R&D contracts to bring roll-to-roll (web-based) manufacturing of lightweight, flexible displays and microelectronic backplanes to market. CHA Industries, which makes high-vacuum deposition systems for precision coating, developed its prototype web coating deposition tool for experimental evaluation of web handling systems with prior USDC funding. It now receive $3m to design and build a new production quality tool for 24-inch web and multiple deposition heads. The first qualification tool will be installed at a USDC member facility for beta evaluation and test. Initially planned for sputter deposition of films in fabrication of polysilicon thin-film-transistor (TFT) backplanes, the tool will also be fitted with a linear organic materials deposition source module (being developed by Kurt J. Lesker Co. under a separate USDC project) for deposition of small-molecule OLED materials onto plastic film substrates. DisplaySearch forecasts OLED market revenue up from from $112m in 2002 to $3.1bn by 2007. iSuppli/Stanford Resources estimate a slightly slower growth rate, forecasting the OLED market to reach $2.3bn by 2008. Growth will come from consumer-driven products, particularly mobile phones and mobile-phone sub-displays, digital cameras, camcorders and PDA's.